Date: Sat, 11 Sep 93 04:30:22 PDT
From: Ham-Homebrew Mailing List and Newsgroup <ham-homebrew@ucsd.edu>
Errors-To: Ham-Homebrew-Errors@UCSD.Edu
Reply-To: Ham-Homebrew@UCSD.Edu
Precedence: Bulk
Subject: Ham-Homebrew Digest V93 #40
To: Ham-Homebrew

Ham-Homebrew Digest Sat, 11 Sep 93 Volume 93 : Issue 40

Today's Topics:

Send Replies or notes for publication to: <Ham-Homebrew@UCSD.Edu>
Send subscription requests to: <Ham-Homebrew-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Homebrew Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-homebrew".

Date: 9 Sep 1993 13:27:11 -0400
From: elroy.jpl.nasa.gov!usc!howland.reston.ans.net!sol.ctr.columbia.edu!
news.kei.com!yeshua.marcam.com!zip.eecs.umich.edu!destroyer!vela.acs.oakland.edu!
vela.acs.oakland.edu!swood@ames.arpa
Subject: FM CW?
To: ham-homebrew@ucsd.edu

Anyone know where I can get a good circuit design for running an audio
tone on FM (144MHz) for morse code communications on my handheld.

My brother and I plan on using our HT's to communicate while hunting this
fall, but will obviously want to keep talking to a minimum.

The unit will have to have some kind of a keyed audio oscillator, as well
as a PTT operating T/R switch as well as some kind of side tone that can
be switched (probably on the same T/R switch) between the incoming audio.

I am using a Yaesu HT (ft-23r) and my brother is using a Kenwood (th-27)

which makes it more difficult due to the different pin-out designs on each
radio's mike and speaker jacks.

thanks in advance for any replies.

swood

wq8b - 73 de scott
--
   YEAH!!! Finally that time of year again - it's whackin` season!!!
 Sept. 08   Opening day of early Michigan Elk seasons (permit only - see guide)
 Sept. 10   Opening day of Michigan Bear season (permit only)
        (Hope you got your permit applications in early...)

Date: Thu, 9 Sep 1993 19:55:10 GMT
From: dog.ee.lbl.gov!agate!spool.mu.edu!sdd.hp.com!col.hp.com!news.dtc.hp.com!
srgenprp!glenne@network.ucsd.edu
Subject: How do Vector Impedance Meters Work?
To: ham-homebrew@ucsd.edu

Richard Karlquist (rkarlqu@scd.hp.com) wrote:

I wrote
: > I think it is fair to say that vector impedance meters are a special
: >case of vector network analyzers. Perhaps it depends upon your
: >context but I generally think of an impedance meter (vector is implied)
: >as a low frequency case of a vector network analyzer. What is
: >
: > The connections to the device are made by way of a transmission line
: >or medium. These connections are in actuality always with some kind of
: >distributed network (the connections) but at low frequencies they were

: The above speculation is fairly wide of the mark when it comes to
: how the HP "vector impedance meters" (4193 or the old 4815) actually
: work. They do not use transmission lines and do not work at all like
: a network analyzer, except the sampling down converter is leveraged from
: the old 8410 network analyzer.

My point was that connections to the DUT aren't ideal. The hardware
isn't perfect and there are parasitics associated with the attachment.
These imperfections and the connections themselves rapidly become
non-negligible as accuracy and frequency are increased.

That's why I included the mention of context. The label "vector
impedance meter" does fit some specific HP products. I was trying to
address what I thought the poster was asking.

: Instead, you have a toroidal current transformer with a 1-turn secondary
: consisting of the probe tip. 2 sampling RF voltmeters measure the voltage
: at the probe tip and the voltage on the primary of the current transformer.
: The signal source power is servoed to maintain constant current and the
: voltage is read out as impedance magnitude. There is also a phase detector
: running at the audio IF frequency to read relative phase of voltage and current
: of give impedance angle. Pretty amazing design using early 1960's technology.

It is pretty amazing. Simulating a current (or voltage) source accurately
over a wide frequency range at the point of measurement while
providing connections which don't perturb the measured data
significantly isn't easy.
  I believe that this is the essential problem that S parameters were
invented to solve. Not only is it increasingly difficult to generate
wideband current and voltage sources but real world devices often don't
operate well when terminated that way. For example, active devices may
oscillate. Measuring a DUT in an environment closer to the application
environment and converting the results to other contexts when necessary
(Y,Z,T parameters etc) can help.

: There are some HP "RF impedance meters" (4191, 4192) which if fact are
: 1 port, 50 ohm network analyzers with firmware optimized for impedance
: measurements. But the original posting asked about VECTOR impedance meters.

Perhaps it's also of use to point out the difference between a measuring
system which includes a directional device to separate stimulus from response
and one which uses something of the "1 + Gamma" variety which looks at
the combined effect. I think that a grid dip meter would fall in the
latter category.

  I took a general interpretation of the original post to be more
like "how do I make something to measure impedance ". Email with him
confirmed that he was interested in inexpensive ways to use lowcost
PLLs and personal computer capabiltiy to measure devices.

: Rick Karlquist
: HP Santa Clara Division R&D
: rkarlqu@scd.hp.com

: "I sit next to the guy who designed the 8410"

Glenn Elmore n6gn

"I was on, and sat in the middle of the design team for the 8510"

Date: Fri, 10 Sep 1993 17:43:15 GMT
From: newshub.nosc.mil!crash!news.cerf.net!usc!howland.reston.ans.net!
newsserver.jvnc.net!udel!gvls1!rossi@network.ucsd.edu
Subject: Modify Heathkit SB series for 160 meters & WARC bands ?
To: ham-homebrew@ucsd.edu

I have an old Heathkit SB-400 sitting in my basement that works but I have
little use for as is. The market for these seems to be limited.

I have always wanted to get on 160 meters and was thinking of putting
this old transmitter to use by modifying it to cover 160 meters and/or
one or more of the WARC bands.

The 2 bands that I am most interested in right now are 160 and 17 meters.

I have not worked out all of the gory details but I would think that for
the most part all that the mod would require is:

- Change the HET OSC crystal and coil for 2 of the band positions.
  Most likely 3.5 and the 14.0 MHz bands would be used.
- Change the DRIVER grid and plate coils/cap for these band positions.
- Adding additional inductance to the final tank for 160 and move
  the 14 MHz tank tap for 17 meters.
- Switch in additional tune and load capacitors for 160.
- Possibly increase inductance of the final plate choke for 160 meters.
  (I hope I don't have to do this)

If this works I may want to consider expanding the mod for 30 and 12 meters
too. Ultimately I was thinking along the lines of something like:

OLD BAND	becomes	NEW BAND
3.5	----->	1.8
7.0	----->	10.0
14.0	----->	18.0
21.0	----->	24.0
28.0	----->	28.0 (same)
28.5	----->	28.5 (same)
29.0	----->	29.0 (same)
29.5	----->	29.5 (same)

I have not gone through the details yet to make sure there will be no
unwanted or undesirable new mixing products that may require additional
traps/filters to be added and/or other side effects but hopefully they
will be minimal.

All in all it seems like it should be a fairly easy to to get something
that will cover these bands. I already have a receiver that will cover
these bands.

Anyone ever done anything like this?

==
Pete Rossi - WA3NNA   rossi@vfl.paramax.COM

Unisys Corporation - Government Systems Group
Valley Forge Engineering Center - Paoli, Pennsylvania
==

Date: Thu, 09 Sep 93 16:58:12 GMT
From: netcomsv!bongo!skyld!jangus@decwrl.dec.com
Subject: Morse Keyboard replacement
To: ham-homebrew@ucsd.edu

In article <40010001@opus.hpl.hp.com> walker@opus.hpl.hp.com writes:

> It recently occurred to me that a keyboard might be
> replaced with an iambic Morse keyer to reduce operator stress.

> Of course, there would need to be extensions made to Morse to send
> upper/lower case, control, escape, and all punctuation symbols.

> Any comments or suggestions?

So, I guess BT could be used to clear the screen and SK would park the heads

Not the least of which, you would have to retrain wordperfect to realise that
'tt' means 'that' and so forth.

See accompanying comments in the P-Spice thread for Morse I/O on software.

Amateur: WA6FWI@WA6FWI.#SOCA.CA.USA.NA | "It is difficult to imagine our
Internet: jangus@skyld.tele.com | universe run by a single omni-
US Mail: PO Box 4425 Carson, CA 90749 | potent god. I see it more as a
Phone: 1 (310) 324-6080 | badly run corporation."

Date: Fri, 10 Sep 1993 15:11:01 GMT
From: sdd.hp.com!caen!uwm.edu!vixen.cso.uiuc.edu!moe.ksu.ksu.edu!
hobbes.physics.uiowa.edu!news.uiowa.edu!icaen.uiowa.edu!drenze@network.ucsd.edu
Subject: Morse Keyboard replacement
To: ham-homebrew@ucsd.edu

walker@opus.hpl.hp.com (Rick Walker) writes:

>In rec.radio.amateur.homebrew, jangus@skyld.tele.com (Jeffrey D. Angus) writes:

>>   > Any comments or suggestions?
>>
>> So, I guess BT could be used to clear the screen and SK would park the heads

>Well, without getting silly, you would need to make extensions for full
>ascii.

>Looking at Morse, there are 26 letters in a space of 30 possible four-symbol
>characters. That leaves 4 characters up for grabs:

>Binary:	Morse:	Ascii:
>0	.	e
>1	-	t
>00	..	i
>01	.-	a
>10	-.	n
>11	--	m
>000	...	s
>001	..-	u
>010	.-.	r
>011	.--	w
>100	-..	d
>101	-.-	k
>110	--.	g
>111	---	o
>0000	....	h
>0001	...-	v
>0010	..-.	f
>0011	..--	UNUSED
>0100	.-..	l
>0101	.-.-	UNUSED
>0110	.--.	p
>0111	.---	j
>1000	-...	b
>1001	-..-	p
>1010	-.-.	c
>1011	-.--	y
>1100	--..	z
>1101	--.-	q
>1110	---.	UNUSED
>1111	----	UNUSED

>Actually, in international Morse, the UNUSED characters above are defined
>as various accented vowels, but for english usage, they are not needed.
>We can use these for things like <ESC>, <BS>, <TAB>, <SHIFT>, etc.

>Here's some special characters already internationally defined:

>   MORSE: ASCII:
>   -----------   -----------

>   RK (.-.-.-)   "."
>   GW (--..--)   ","
>   HH (.......)   "BACKSPACE" (error)
>   BT (-...-)   "=" (double dash) - perhaps use this for carriage return
>   OS (---...)   ":"
>   KR (-.-.-.)   ";"
>   KK (-.--.-)   "(" or ")"
>   DN (-..-.)   "/"
>   AS (.-...)   (wait) - perhaps use for "^S"
>   AR (.-.-.)   (end of message) - perhaps use for "^D"
>   WG (.----.)   "'"

>Now add the hack that "C" prepended to any character is a control character:

>   CA (-.-..-)   "^A"
>   CB (-.-.-...)   "^B"
>   CB (-.-.-.-.)   "^C"
>   CD (-.-.-..)   "^D"
>   ...

>Now you just need to do is define the rest of the punctuation characters:

>   .!@#$%^&*()-_+={}[]\|'";:><,./?`~

>These could be mapped to digraphs starting with ".-.-" for <punctuation>:

>   <punc>A (.-.-.-)   .
>   <punc>B (.-.--...)   !
>   <punc>C (.-.--.-.)   @
>   <punc>D (.-.--..)   #
>   ...

>What I'd really like to hear from this group, though, is good algorithms
>for doing morse code detection in software... For instance, how do you
>optimally track a changing WPM rate?

>--
>Rick Walker

I forsee some more possible problems: First, you need to design software
intelligent enough to figure out that a long pause is a space between words.
Second, some of the peculiar spacing rules. Ie, two spaces after a colon,
two spaces after a period at the end of a sentence. As for shift, well...
following the paradigm of prepending a C to a character for a control char
(eg, CC for Ctrl-C) we could do SA for shift-A, etc. Only problem I can
see would be if we wanted to use SK for something. Or we could also do
UA for "uppercase-A." Near as I can remember, no prosigns, etc. begin with
dadadit.

Peace es 73 de Doug N0Z??
03W 04D 21H 11M and counting...

--
__ /| | Douglas J Renze | Charter Member, Popular Front
\'o.O' | +1 319 337 4664 | for Revolutionary Darwinism:
=(___)= | drenze@isca.uiowa.edu |
   U | Douglas-Renze@uiowa.edu | Evolution Now!

Date: Fri, 10 Sep 1993 09:48:44 GMT
From: swrinde!gatech!howland.reston.ans.net!agate!doc.ic.ac.uk!uknet!mcsun!dxcern!
frode@network.ucsd.edu
Subject: Software for Circuit Cellar Ink articles
To: ham-homebrew@ucsd.edu

I am looking for the software for an article that appeared in
the September Issue of the journal
     Circuit Cellar Ink, The Computer Applications Journal.

The article is "Neural Network Basics" by Dwayne Phillips,
Sept. 1993, issue #38, p.36-43.
The software should be available on The Circuit Cellar BBS, but I
have no modem access and I am wondering if anybody knows if this
BBS is mirrored somewhere on an Internet machine?

Frode

****
*   Frode Weierud   Phone   :   41 22 7674794   *
*   CERN, SL   Fax :   41 22 7823676   *
*   CH-1211 Geneva   23   E-mail   :   frode@dxcern.cern.ch
      *
*   Switzerland   or   weierud@cernvm.cern.ch
      *
****

Date: 11 Sep 93 02:54:26 GMT
From: ogicse!uwm.edu!cs.utexas.edu!csc.ti.com!tilde.csc.ti.com!mksol!
blair@network.ucsd.edu
To: ham-homebrew@ucsd.edu

References <1993Sep7.134439.22935@ke4zv.atl.ga.us>,
<1993Sep9.054942.11654@mksol.dseg.ti.com>, <1211@pig.UUCP>
Subject : Re: NASA select rcvr

Great thread, eh?
Sounds like a used block converter is the way to go alright.
2 problems remain...
The antenna. What is the typical gain of a 6-7 foot dish? Do you
think I could get by with a horn? Assuming I could keep the
birds from nesting in it, it would be easier to mount on the
chimney and less intrusive.
The IF output. Particularly demodulation. God but I dread the
notion of buying a TV! It may sound silly (OK it probably
does sound silly) but it's against my philosophy to even
own one, much less turn it on. Are chips readily available
to roll your own TV tuner? A single frequency unit ought to be
simple enough. I dont want it to even LOOK like a TV.

By the way. It sounds like the LNB's are pretty much self contained.
What are those control (?) boxes they sell with them that sit on the
TV inside. If the LO is fixed frequency, what more is there to do
but turn it on and off?

Does the IF bandwidth of the LNB occupy the entire UHF band?
Do LNB's usually come with the feedhorns attached?

If LNB's are so cheap why do new TVRO systems cost so much?
Where's the expensive part?
Art.

Date: 10 Sep 93 07:10:02 GMT
From: sdd.hp.com!math.ohio-state.edu!howland.reston.ans.net!noc.near.net!
transfer.stratus.com!jjmhome!pig!die@network.ucsd.edu
To: ham-homebrew@ucsd.edu

References <1993Sep7.033320.28801@mksol.dseg.ti.com>,
<1993Sep7.134439.22935@ke4zv.atl.ga.us>, <1993Sep9.054942.11654@mksol.dseg.ti.com>
Reply-To : jjmhome!pig!die@transfer.stratus.com
Subject : Re: NASA select rcvr

In article <1993Sep9.054942.11654@mksol.dseg.ti.com> blair@mksol.dseg.ti.com (arthur blair) writes:

> Forgive my ignorance but... 120,15,30 degree? Do you mean beamwidth or >Noise temperature or something else?

C band LNAs and LNBs are by tradition rated in terms of noise temperature in degrees Kelvin. For marketing reasons, Ku band LNB's are rated in terms of noise figure instead (I guess so the early ones wouldn't look so poor compared to C band).

>
>: foot dish with offset feed is pretty much standard now instead of the
>
> offset feed?

Offset feed dish antennas have the feed horn located at some other place than the mechanical focal center of the dish. A common configuration is to use a feed offset below the dish. This allows two things. First the feed is not blocking signal from the sky getting to any part of the dish, which makes for greater aparture efficiency (gain/size), particularly if the reflector is small relative to the size of the feed, LNB, and supports which is often true at Ku band. And second the feed horn is usually pointing upwards at cold sky around the edges of the dish rather than downwards at warm ground which makes the noise temperature of the antenna substantially lower which is very important with weak satellite signals. Other advantages are that the reflector is usually closer to vertical and less likely to collect snow, and that the feed supports and LNB are out of the beam which reduces sidelobes (both helping with noise temp and with pattern characteristics)

Offset feeds are almost universally used for the Ku band VSAT terminals that litter the roofs of commercial buildings these days, just look at your nearest Wallgrens or Sears for one or more examples (dozens on a strip mall). They are still quite rare for home TVRO installations which are primarily C band. This is because most Ku band offset feed antenna designs use very shallow dishes (high F/D) to avoid coma and allow the use of a more or less standard nearly parabolic shaped reflector and that kind of focal distance with a 6 or 8 foot reflector at C band is awkward and unwieldy looking.

> Since I'm literally only interested in 1 channel do you think the old LNA/ >single conversion receiver would be sufficient? NASA select is C band.

As I said in a private email message, your best bet is almost certainly one of the early non descrambler equiped block down conversion

type receivers. LNA/single conversion stuff is certainly available but used block receivers without integrated descramblers are so cheap at hamfests ($25-$50) that it is really silly to try to use the first generation TVRO receiver technology. Much of the first generation stuff designed for home use was pretty terrible and drifts and distorts video, and to boot has significantly worse FM threshold than than good examples of the block conversion second generation which often have threshold extending demodulators (tracking filters).

If you were to build a receiver, you would do much better to work at the L band (950-1450) output of a LNB with TV tuner class technology than to try to build the image rejecting mixers required to get good noise performance at 4 ghz with single conversion. And while you can buy the whole 1st generation TVRO downconverter assembly used for next to nothing, it will have an unstable voltage tuned VCO for a first LO rather than the nearly xtal oscillator stablity DRO used in LNB's, and you will probably need to mount it outdoors near the antenna (because 4 ghz coax runs are either very expensive - heliax - or very short); outside near the antenna where stablity issues are even worse due to temperature changes.

And in addition, used LNBs in the 45-60 K range are $5-10 at hamfests whereas you will find most junk LNAs are more like 80-100 K. Brand new 25-30 K LNBs are a commodity item you can buy for $80-100 or less, 25-30 K LNAs are a special order commercial item that you are likely to have to pay $125 to $150 or more for and may have trouble finding.

>Since it sounds obsolete maybe I can get a deal on a dish/LNA combo.

It is very obselete, the switchover to LNBs in new home TVRO installations happened about 1983 or so. Thus anything you are likely to find is ten years old and probably pretty battered (rusted, corroded) by the weather (rain is pretty acid around here and antennas don't last).

The advent of scrambling in 1986 and the recent conversion of to the new VCII+/RS technology have left a lot of more modern block downconversion stuff orphaned. You are better off looking for that.

>I'd like to keep the dish small though, since it'll probably
>have to sit on the roof to see low enough south.

NASA select is on Satcom F2 at 72 West (almost exactly due south of me) - in Texas this will be southeast. Pays to work the spherical trig with a calculator or run one of the many programs that do this and get exact numbers for azimuth and elevation. You can then borrow a transit or theodelite and figure out exactly where the bird is relative to trees, houses and other obstructions (as you know, microwaves don't

penatrate foliiage well so you need a clear view).

A trick that is possible at this time of year (near the equinox) is to use the sun to tell you where the satellites are and where you can see them on your property. Around the first of October or late September depending on your latitude (later the further north you are) the sun lies directly behind the Clarke belt, and all you have to do is figure out what time of day the sun is behind Satcom F2 and look out the window to see what is in shadow and what in sunlight at that time. An ephemeris program or the old standby Nautical Almanac at the local library will give celestial longitudes for the sun versus time of day and you will be close enough by using the time the sun is at 72 West.

With a 5-6 foot dish and a decent grade 25 K LNB you should be able to see the NASA Select on F2 transponder 13 just about at or slightly above FM threshold (a few sparklies - aka FM clicks). Some of the stronger transponders will be nearly perfect, but unfortunately transponder 13 seems slightly weaker (2 db or so) than the strong ones on F2.

> Whats the typical noise figure for the old LNA systems?

As I said earlier, old LNAs that you are likely to find run around 80-100 K (that is the best that was possible in the early 80s) (or a nf around 1.6 db). But upgrading one with a $5-$10 45 K LNB and a mid 80s block conversion receiver (maybe $35) still costs under $50 and will give much better performance.

But if you want the smallest dish possible, you will have to use a $90 25 K LNB anyway (but you still could use that $35 receiver).

> Maybe I can do better with a narrow band LNA with a good enough noise figure
> to keep the dish small.?.

You could in theory build one, but unless you have very very good parts available for free at work you will have real trouble equaling a mass produced 25K LNB for $80. And the effort required will be very large compared to that $80 (you would be working for Mexican peasant wages or less). And of course you will need all the right test equipment and microstrip fabrication facilities and so forth. I would guess that with a 6 foot dish having a noise temp of around 40 K at your elevation that anything you could gain from narrow band design would make very little difference compared to the commercial <25 K unit.

You are the rf engineer and I just dabble (incompetantly to boot) in software and digital hardware mostly, but my guess is that even with narrow band matching you might only get down to 15-20 K and that only with careful tweeking.

> Did they ever make small C band dishes/feeds?

     Most certainly. The first VSAT (introduced by Equatorial Communications in the early 80s), managed to pull 19.2kb data out of the sky with dishes as small as 18 inches - these are still around and can be identified by the distinctive waveguide splash feed they use.

     The practical limit to dish size at C band is directivity these days rather than G/T, since very low noise amplifiers exist. The problem is that the FCC has mandated 2 degree spacing between satellites and dishes much smaller than 6 feet don't supply enough directivity to reject adjacent satellites.

    >Art.

            David I. Emery - N1PRE - Lexington   Mass.
    Former senior technical consultant (and currently unemployed drunken bum)
Internet: jjmhome!pig!die@transfer.stratus.com (preferred) or die@world.std.com
UUCP: ...uunet!stratus.com!jjmhome!pig!die   Phone + fax: 1+(617)-863-9986

End of Ham-Homebrew Digest V93 #40
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